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LEAD CONCENTRATIONS IN SOIL ON RESIDENTIAL, PUBLIC AND PUBLICLY ACCESSIBLE COMMERCIAL PROPERTIES IN THE VICINITY OF TORONTO REFINERS AND SMELTERS LIMITED, TORONTO - 1985-1987

ARB-094-88 Phyto

JUNE 1988

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Ontario
Ministry
of the
Environment

Jim Bradley
Minister

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MINISTRY OF THE ENVIRONMENT
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Lead Concentrations in Soil on Residential, Public and Publicly Accessible Commercial Properties in the Vicinity of Toronto Refiners and Smelters Limited, Toronto - 1985-1987

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SOMMAIRE

En octobre 1987, le ministère de l'Environnement a annoncé qu'il entreprendrait un programme d'enlèvement du sol dans le quartier de la rue Niagara en 1988, programme analogue à celui de South Riverdale. La ligne directrice à cet égard a été fixée à 500 µg/g de plomb à sec. En 1985 et 1986, la Section de phytotoxicologie, dans le cadre de ses programmes ordinaires et à la demande expresse des habitants du quartier (la Niagara Neighbourhood Association) et du service d'hygiène publique de Toronto, avait déjà analysé le sol à un certain nombre de lieux résidentiels et de lieux industriels et commerciaux accessibles au public afin d'en relever les concentrations de plomb. En octobre et novembre 1987, cette même section a effectué un vaste programme d'échantillonnage du sol dans le quartier en vue d'établir quelles propriétés, privées, publiques ou commerciales, seraient admissibles au programme. La zone d'échantillonnage, délimitée en collaboration avec le service d'hygiène publique de Toronto, s'étend à 300 mètres à l'ouest, au nord et à l'est des limites de la Toronto Refiners and Smelters.

Des 161 propriétés résidentielles échantillonnées, 125, ou 77,6 %, présentaient des concentrations de plomb égales ou supérieures à 500 µg/g à un ou plusieurs lieux d'échantillonnage. Le nombre total de lieux d'échantillonnage résidentiels s'élevait à 352, condominiums compris, et 205, soit 58,2 %, d'entre eux dépassaient le seuil des 500 µg/g.

La concentration maximale de plomb dans le sol en milieu résidentiel s'établissait à 4450 µg/g (cour arrière de la rue Niagara, 1986). Venaient ensuite une concentration de 3700 µg/g (cour arrière de la rue Portland, à une profondeur de 15 à 20 centimètres) et de 2950 µg/g (cour arrière de la rue Niagara.)

Quant aux 136 lieux publics et lieux commerciaux accessibles au public, 66, ou 48,5 %, présentaient des concentrations de plomb dans le sol supérieures à 500 µg/g. Là-dessus, 33, ou 24,3 %, ont révélé des concentrations égales ou supérieures à 1000 µg/g. La concentration maximale se situait à 64 500 µg/g (côté ouest de la rue Bathurst, le long de la clôture de la société.)

Une concentration acceptable de plomb (< 500 µg/g) dans la couche superficielle d'un sol résidentiel, soit à une profondeur de 0 à 5 centimètres, ne signifie pas forcément que la concentration est acceptable à une profondeur supérieure. Pour établir si une propriété est admissible à un programme de remplacement du sol, à une profondeur de 30 centimètres, il est recommandé de recueillir et d'analyser des échantillons à une profondeur de 15 à 20 centimètres, échantillons qu'on prélèvera sur les lieux mêmes ou à proximité des propriétés résidentielles dont le sol superficiel présente des concentrations de plomb allant de 200 à 500 µg/g. Ici, le critère à respecter sera la moyenne des résultats de la couche de 0 à 5 centimètres et de la couche de 15 à 20 centimètres. Il reste à analyser la couche de 15 à 20 centimètres de 59 lieux résidentiels (voir le tableau 1). Par ailleurs, de nouveaux échantillons seront prélevés dans le cas des 9 lieux (voir le tableau 1 encore une fois) dont la moyenne était inférieure à 500 µg/g mais dont un des résultats dépassait ce chiffre. Le protocole est identique à celui qui régit le programme de remplacement du sol de South Riverdale.

Lead Concentrations in Soil on Residential, Public and Publicly Accessible Commercial Properties in the Vicinity of Toronto Refiners and Smelters Limited, Toronto 1985-1987

Introduction

In October 1987, the Minister of the Environment announced that a soil removal program in the Niagara Neighbourhood, similar to that currently underway in South Riverdale, would commence in 1988. The soil replacement guideline will be 500 µg/g lead on a dry weight basis. Sampling of a limited number of residential and publicly accessible commercial industrial sites to determine soil lead concentrations was conducted by the Phytotoxicology Section in 1985 and 1986, in response to requests from local residents (the Niagara Neighbourhood Association), the Toronto Department of Public Health, and as part of routine assessment survey programs. In order to identify all sites eligible for soil removal, during October and November 1987 the Phytotoxicology Section conducted an extensive soil sampling program on residential, public and publicly accessible commercial properties in the Niagara Neighbourhood. The designated sampling zone was established in consultation with the Toronto Department of Public Health. Basically, the zone extends 300 m to the west, north and east of the Toronto Refiners and Smelters property line.

Methods

All residential properties which lay within the designated study zone were selected for sampling. The approximate boundaries of the designated study area are King Street West to the north, Walnut Avenue to the west, the railway lands to the south, and Draper Street to the east (see Fig. 1). The study area was considered to contain 168 residential properties plus a condominium development which occupies most of the block bounded by King, Tecumseth, Wellington and Bathurst streets; the latter was considered as one property for the purposes of this study, giving 169 residential properties in total. As a result of refusals, lack of access or lack of suitable sampling area, the number of properties actually sampled was 161. Of this number, 7 properties could not have the backyard sampled due to lack of access. The condominium development was considered as 1 property and was sampled at 22 sites in total. The total number of residential sampling sites was 352. Additionally, a total of 136 sites were sampled on public and publicly accessible commercial property (Fig. 2). Public properties sampled included parks (Victoria Park and a part of Stanley Park), boulevards and laneways. Publicly accessible commercial areas sampled included lawns, gardens, unimproved soil plots, and gravel or soil parking areas and driveways.

Soil sampling was conducted using standard Phytotoxicology Section techniques. Usual sampling depth was 0-5 cm; this depth is generally used for lawns and other uncultivated areas. Shallower sampling (0-2 cm) was done at sites where packed and/or very coarse soil was encountered (e.g., on driveways). A sampling depth of 0-15 cm was used for gardens and other cultivated areas. Two separate samples were collected at each site (duplicate sampling) and the results were averaged. A site consisted of any distinctly different area of reasonable size, with soil, on any property. Typical sites could include a front lawn, front garden, side lawn, back lawn, back flower garden, back vegetable garden (perhaps more than one site) and parking area. Periodically, a sampling depth of 15-20 cm also was used to assess the extent of sub-surface soil lead contamination. This sampling depth was used on 77 residential property sites and 18 commercial/public sites, one sample only per site. In order to minimize contamination from peeling paint, soil cores were not collected closer than 0.5 m from painted exterior surfaces.

The samples were air dried and sieved to 0.35 mm particle size, and were analyzed for lead at the MOE, Laboratory Services Branch.

Results

Table 1 presents the results of the TRS soil lead sampling program on residential properties. Table 2 gives results from public and publicly accessible commercial properties. Concentrations of lead in excess of 500 µg/g are underlined in Table 1. Of the 161 residential properties sampled, 125 (77.6%) had one or more sample sites with greater than, or equal to, 500 µg/g lead in soil. The total number of residential sampling sites, including those in the condominium development, with greater than 500 µg/g lead was 205 (58.2% of the 352 residential sites sampled). Sample sites include 0-2 cm, 0-5 cm and 0-15 cm sampling depths; 15-20 cm samples were considered to represent the same site as the associated 0-5 cm sample. A soil lead concentration of ≥500 µg/g at either 0-5 cm or 15-20 cm would give a site result ≥500 µg/g.

The maximum soil lead concentration measured for residential property samples was 4450 µg/g (back garden, Niagara St., 1986). The second highest residential level measured was 3700 µg/g (15-20 cm depth, back lawn, Portland St.). The third highest level was 2950 µg/g (back lawn, Niagara St.).

For the 136 public/publicly accessible commercial sites sampled, 66 (48.5%) had greater than 500 µg/g soil lead. Of these, 33 (24.3%) had a soil lead level equal to or greater than 1000 µg/g. The maximum soil lead concentration measured on commercial/public property was 64,500 µg/g (west side of Bathurst alongside of TRS fence).

The confidence interval of the sample estimates can be obtained from duplicate sample results. The data set consisted of 229, 0-5 cm duplicate soil results collected in 1987 from residential and public/commercial properties, not including sites thought to have replacement soil. For the data set mean of 785 µg/g, the 95% confidence interval is 625 µg/g to 986 µg/g; this is approximately minus 20% to plus 25%.

Results of the subsurface (15-20 cm depth) sampling on residential properties were surprising in that, at 33 of 62 sites examined, the 15-20 cm soil lead level was greater than the associated 0-5 cm sample depth. (Although 77 15-20 cm samples were obtained on residential sites, 15 were excluded from the comparison due to known soil replacement activity.) The mean value of the 62, 15-20 cm samples was

680 µg/g; for the corresponding 0-5 cm samples it was 626 µg/g. However, for public/commercial sites the 0-5 cm samples had greater soil lead levels than the associated 15-20 cm samples at 16 of 18 sites. The mean lead value of the 18 public/commercial 15-20 cm samples was 268 µg/g; for the corresponding 0-5 cm samples it was 631 µg/g.

The elevated soil lead levels at 15-20 cm depth, relative to the associated 0-5 cm depth, found in this study on residential properties may indicate historically high lead contamination at the surface, followed by downward transport or perhaps soil modification (replacement, addition, cultivation) by the residents. Regardless of the reasons for the lead contamination of subsurface soil, it is clear that an acceptable residential soil lead concentration (i.e., < 500 µg/g) in the surface 0-5 cm layer does not necessarily imply an acceptable concentration at depth. Therefore, in order to determine eligibility for soil replacement (to 30 cm depth), it is advisable to collect and analyse subsurface (15-20 cm) samples at or adjacent to all residential sites having surface soil lead levels of between 200 and 500 µg/g. For these sites the soil replacement criteria will be the average of the 0-5 cm and 15-20 cm results. The number of residential sites on which subsurface soil sampling remains to be done is 59 (identified in Table 1). Additionally, for those 9 sites (identified in Table 1) for which the average soil result was less than 500 µg/g, but in which one of the duplicate results exceeded 500 µg/g, the soil sampling will be repeated. This protocol is the same as that developed for the South Riverdale soil replacement program.

It is not considered necessary to conduct this additional sampling at the non-residential publicly accessible sites because, as described earlier, available subsurface results at these sites are generally lower than surface results and because the risk associated with subsurface contamination (principally from gardening) is lower than at residential sites. It is recommended that decisions on whether remedial action should be taken at specific non-residential sites should be based on consideration of both the surface soil lead results and site accessibility (frequency and ease) to young children.

Historical Trends In Soil Lead Levels On Properties Where Soil Is Not Known To Have Been Replaced - 1976 and 1986/87

In 1977, soil was replaced by the Ministry of the Environment to a depth of 15 cm at 9 sites on 7 residential properties having more than 2600 µg/g lead. Soil replacement at several other sites, due to activities such as construction, also has apparently occurred. Subsequent monitoring of soil lead levels on these properties has revealed significant re-contamination (Table 3) but it is not known to what extent this may be due to continued emissions from TRS versus inadequate soil replacement. In order to more accurately examine changes in soil lead levels due to actual changing emissions (from all sources), a comparison was made of soil lead concentrations found in 1976 with those obtained in 1986/87 on properties where soil replacement is not known to have been conducted (Table 3). For the 52 residential sites where direct comparisons could be made, the mean surface soil lead concentration decreased from 970 µg/g in 1976 to 704 µg/g in 1986/87, a 27.4% decrease. As a result of this comparison, it was apparent that

40 of 52 sites showed a decrease in soil lead levels while 12 sites located near the TRS property showed an increase.

Summary

1. Of the 161 residential properties (352 sites) sampled, 125 properties (205 sites) had soil lead concentrations equal to or exceeding 500 µg/g.

2. Of the 136 public/publicly accessible commercial sites sampled, 66 sites had soil lead concentrations equal to or exceeding 500 µg/g; 33 sites equaled or exceeded 1000 µg/g.

3. On most properties where soil is not known to have been replaced in the 1970's, surface soil lead levels decreased from 1976 to 1986/87. Properties showing increased lead levels were located near TRS.

TABLE 1

Soil Lead Concentrations (µg/g dry weight) for Residential Properties in the TRS Designated Study Area, 1987

	Soil Lead Concentration (µg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Niagara Street				
front, soil piles		920		
back, lawn		610	800	
back, soil pile		680		
front		810	870	
back				1150
front		265	r	
back^{+}		2950		
front		500		
back		2600		
front		1600	1800	
back^{+}		1250	1600	
front^{+}		350*	r	
back				4450*
front		245*	r	
back		1600*		
front		315	370	
back		1080	1600	
front		225*	r	
back		1100		
front		refused access		
back				
front		380	810	
side		790*		
front^{+}		420	r	
back^{+}				1900
front^{+}		500*		
back^{+}		2400*		
front		paved		
back^{+}		no access		

TABLE 1 (Cont'd)

	Soil Lead Concentration (µg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Niagara Street (cont'd)				
front	865			
back		885	1700	
front		paved		
back		1350		
front		1200	920	
back		1450		
front		500*		
back		735*		
front		260*	r	
back		960*		
front		1200*		
back		1300*		
front		1200	1600	
back				795
front		85		
side	365		r	
front		565*		
back		paved		
front		705	550	
back		1075		
front		250*	r	
back lawn		315*	r	
back garden				325
front lawn		400*	r	
front garden				640*
back		paved		
front		410	r	
side		670		
front		625		
back				545
front		820		
back lawn		755		
back parking area	130			

TABLE 1 (Cont'd)

	Soil Lead Concentration (µg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Niagara Street (cont'd)				
front		675	750	
back		paved		
front		315	r	
back		paved		
front		550		
back				550
front		645		
back				665
front		360	r	
back		270	r	
front		535	660	
back		70	100	
front		690		
back		no access		
front		540		
back		paved		
front		525		
back				1150
front		360	r	
back garden				220
back parking area	160			
front		710	320	
back		250	1400	
front		660		
back		paved		
front		550		
back				1850
front		280	r	
back		paved		
front		600	760	
back	305		r	

TABLE 1 (Cont'd)

	Soil Lead Concentration (µg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Niagara Street (cont'd)				
front		590		
back	580			
front		∿480	r	
back lawn		59		
back parking area	160			
vacant lot		595		
front		570		
back		∿480	r	
front		500**		
back				390
front garden south				450
front garden north				430
back		1300		
front lawn		250	230	
front garden				310
back				355
front lawn		310		
front garden			r	∿485
back lawn		355	r	
back garden, centre				100
back garden, south				85
front		760		
back	160			
Walnut Street				
front		305	440	
back		refused access		
front		320	r	
back		425	r	
front				470
back lawn		360	620	
back garden				515

- -

TABLE 1 (Cont'd)

	Soil Lead Concentration (µg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Walnut Street (cont'd)				
front		paved		
back lawn		345	r	
back garden				415
front		paved		
back		paved		
front		515		
back		345	r	
front		520		
back	320		r	
front		540	590	
back lawn		105	100	
back garden				260
front		paved		
back garden, south				900
back garden, north				770
front		paved		
back garden, south				795
back garden, north				905
front		paved		
back	335		r	
Tecumseth Street				
front	1400			
back lawn		345	r	
back garden				335
side (at corner)		535		
front	525			
back				400
front		paved		
back		paved		
front		585	310	
back lawn		735	780	
back garden				740

TABLE 1 (Cont'd)

	Soil Lead Concentration (µg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Tecumseth Street (cont'd)				
front		410*	r	
back				1050*
front		575		
back				690
front		545*		
back		610*		
front		760		
back		1300		
front		220	r	
back		no access		
front		515	340	
back		345	520	
front		350	r	
back				465
front		235	r	
back				640
front		260	r	
back				325
front/side		240	210	
side lawn		345		
side, garden at drive				215
side, east		690	330	
side, west		710		
front		240	r	
back		paved		
front		710		
back		1400		
front		405	430	
back				705
front		paved		
back lawn		935	950	
back garden				330

TABLE 1 (Cont'd)

	Soil Lead Concentration (μg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Tecumseth Street (cont'd)				
front		paved		
back		1700		
front, condominium development		40	20	
back, condominium development		25	17	
front, condominium development		55	120	
Draper Street				
front		815		
side		435	390	
back	460		r	
front garden		1300		
front garden (#3+#5)				515
back lawn		~470	950	
back garden				505
front		550	410	
back		125	530	
front				725
back lawn		600		
back garden				555
front		465	r	
back lawn		395	r	
back garden				595
front		paved		
back lawn		605		
back garden				735
front				290
back lawn		320	r	
back garden				400
front				910
back lawn		745		
back garden				590

TABLE 1 (Cont'd)

	Soil Lead Concentration (µg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Draper Street (cont'd)				
front/side walkway	595			
front garden				260
back lawn		505		
back garden				605
front		paved		
back		610	580	
front				595
back lawn		725		
back garden				1100
front garden		570		
front/side walkway	595			
back	1350			
front		905	350	
back lawn		850		
back garden				885
front		paved		
back		paved		
front		950		
back lawn		595	430	
back garden				530
side walkway		1200		
back garden, north				480
back garden, south				285
back garden, east				190
front		600		
back gravel cover	860			
back garden				300
front		575		
back		565		
front		1100		
back lawn		690	460	
back garden				515
front		1200	1200	
back lawn		700	910	
back bare area		735		
back garden				125

TABLE 1 (Cont'd)

	Soil Lead Concentration (µg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Draper Street (cont'd)				
front		925**		
back		880**		
front		370	r	
back lawn		475		
back garden, north		825		
back garden, south				335
front		paved		
back		740	1000	
front		paved		
back				585
front				650
back		no access		
front	625			
back		refused access		
front		935	650	
back				705
front		paved		
back		no access		
Portland Street				
front garden				230
side lawn, north		175	73	
side soil strip, south		275		
front		1150		
back		none		
front		380**		
back		1550**		
Portland/King Streets				
front		970	400	
back		2050	3700	
front/side north		840		
front/side south		835		

TABLE 1 (Cont'd)

	Soil Lead Concentration (µg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Stewart Street				
front		1045		
back lawn		930	1200	
back garden				405
front		1050	1100	
back		595		
front				1150
back lawn		1350		
back garden				1000
front		1200		
back		∿480	820	
front				885
back, under construction		200	r	
front				900
back, under construction		200	r	
King Street West				
front		770		
back		250*	r	
front		paved		
back		∿485*	r	
Wellington Street West				
front lawn		410	300	
front garden				∿440
back lawn		500	430	
back garden				1050
front		560		
back		paved		
front		595		
back		∿475	r	
side		500	280	
back/side		775		

TABLE 1 (Cont'd)

	Soil Lead Concentration (µg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Wellington Street West (cont'd)				
front		paved		
back		1400		
front		paved		
back		610		
front		410	r	
back		555	580	
front		820*		
back		680*		
front		280*	r	
back		575*		
front		500*		
back		815*		
front		paved		
back		260*	r	
back, between 601-603		340*	r	
front		paved		
back garden				48*
back parking area	160*			
front		405*	r	
back		610*		
front		paved		
rear		paved		
front		535*		
back lawn		1145*		
back garden				730*
front		505*		
back				380*
front		paved		
back		paved		
front		550	650	
back		650	410	
front		52		
back		paved		

TABLE 1 (Cont'd)

	Soil Lead Concentration (μg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Wellington Street West (cont'd)				
front		375	r	
back		paved		
front		405	460	
back lawn		65	210	
back garden				420
side	320			
front		560		
back		1050		
front		24**		
back		160**		
front		155		
back		340	r	
front east		445	r	
front west		460	r	
back lawn		870		
back parking area	570			
front		500	460	
back		505		
front		615	300	
back garden				470
back parking area	570			
front				425**
back				695**
front		390	320	
back	455		r	
front		∿490	r	
back		480	r	
front		paved		
side		345	170	
front		425	r	
back		1050		
front		540	330	
back		690	1180	

TABLE 1 (Cont'd)

	Soil Lead Concentration (µg/g)			
	Sampling Depth in cm			
Location/Sites	(0-2)	(0-5)	(15-20)	(0-15)
Wellington Street West (cont'd)				
front		330	r	
back		no access		
front		paved		
back		120		
front		paved		
back lawn		520		
back garden				930
front		paved		
back		435	r	
side lawn		555		
side parking area	370			
back		465	140	
front, condominium development		45	200	
back, condominium development		25	20	
front, condominium development		40	20	
front, condominium development		45	20	
A common, condominium development		30	20	
B common, condominium development		25	16	
C common, condominium development		105	140	
D common, condominium development		25		
E common, condominium development		20	10	
F common, condominium development		20	10	
G common, condominium development				15
H common, condominium development		20	10	
I common, condominium development		25	10	
J common, condominium development		15		
K common, condominium development		40		
Bathurst Street				
front		paved		
side	1250			
front		paved		
back	780*			

TABLE 1 (Cont'd)

Location/Sites	Soil Lead Concentration (μg/g) Sampling Depth in cm (0-2)	(0-5)	(15-20)	(0-15)
Bathurst Street (cont'd)				
front		paved		
back		280*	r	
front		paved		
back	1300*			
front		paved		
back	2300*			

Concentrations exceeding the 500 μg/g "Upper Limit of Normal" guideline are underlined.

- * 1986 results
- ** 1985 results
- ∿ one replicate ≥ 500, mean < 500 μg/g (to be re-sampled)
- + soil known to have been replaced in 1977
- r to be resampled to assess contamination at depth.

TABLE 2

Soil Lead Concentrations for Public Properties and Publicly Accessible Commercial Properties in the TRS Designated Study Area, 1987

		Soil Lead Concentration (µg/g)			
	Loc.	Sampling Depth in cm			
Location	Code	(0-2)	(0-5)	(15-20)	(0-15)
Niagara Street					
front garden	01				25
lane	02	80			
boulevard, north side	03		1350		
parking lot, south section	04	425			
parking lot, north section	05	445			
parking lot, north soil pile	06				695
parking lot, NE corner	07		515		
parking lot, NW corner	08		1300		
parking lot, SE section	09	515*			
parking lot, between sidewalk and gate	10	710*			
base of trees beside sidewalk, south side	11	2700*			
driveway, near sidewalk	12	265			
lane	13	260			
front lawn, south section	14		260		
front lawn, north section	15		255	180	
boulevard, west side, south of driveway	16		120		
boulevard, west side, north of driveway	17		205		
front lawn, Niagara St. Public School	18[a]		170		
side lawn, Niagara St. Public School, east section	19[a]		160		
side lawn, Niagara St. Public School, west section	20[a]		135		
Walnut Street					
boulevard, east side	21		545		
park, boulevard, west side	22		125	210	
park, bush garden east of tennis court	23				60
park, lawn, northeast of tennis court	24		69		
park, strip between pool and sidewalk	25		80	100	
park, west side of pool building to pine trees	26		60		
park, north of pool	27		86		
grass strip	28		890		
side lawn	29		325	190	
Tecumseth Street					
south end of Tecumseth, coarse aggregate	30	1700*			
driveway, near south end of Tecumseth	31		2450*		
parking lot, coarse aggregate	32	2300*			

TABLE 2 (Cont'd)

		Soil Lead Concentration (µg/g)			
	Loc.	Sampling Depth in cm			
Location	Code	(0-2)	(0-5)	(15-20)	(0-15)
Tecumseth Street (cont'd)					
parking lot, between railway tracks	33	20000*			
east side, S. of Niagara, coarse aggregate	34	1200*			
west side, coarse aggregate	35	1100*			
lane, east side	36		320*		
parking area	37	82*	760* at fence		
boulevard	38		130		
lane	39	5050			
Wellington Street West					
flower garden	40				35
front lawn	41		275	66	
front lawn, corner of Portland	42		200		
loading dock area	43	625			
grass/weed strip	44		620		
Victoria Park, triangular area east of statue	45		280	140	
Victoria Park, triangular area north of statue	46		385		
Victoria Park, triangular area south of statue	47		340		
Victoria Park, triangular area west of statue	48		410	210	
Victoria Park, sand play area at swings	49				200
Victoria Park, west of wading pool	50		575	400	
boulevard, south side, north of Park	51		400		
boulevard, south side, north of parking lot	52		615		
side lawn, east section	53		375		
side lawn, west section	54		320	110	
boulevard, north side, unimproved, west of Portland	55	590			
hedge strip	56		1250**		
parking area	57	610			
boulevard, north side, opposite wading pool	58		1120		
boulevard, north side, 40m-60m east of Bathurst	59		430	60	
boulevard, north side, 20m-40m east of Bathurst	60		96		
boulevard, southwest corner at Bathurst	61		1000	280	
alley way	62		255		
lane	63	505			
boulevard, north side	64		365		
boulevard, south side	65		290		
coarse aggegate, north side, E. of stop sign	66	520*			
boulevard, north side, at Niagara	67		675**		
flower garden	68		360		
grass/weed strip	69		405		
lane	70	410			
Metro Transfer Station, northeast corner	71		670**		
boulevard, south side, at Metro Transfer Station	72		710		

TABLE 2 (Cont'd)

		Soil Lead Concentration (µg/g)			
		Sampling Depth in cm			
Location	Loc. Code	(0-2)	(0-5)	(15-20)	(0-15)
Wellington Street West (cont'd)					
boulevard, south side, opposite tennis courts	73		605		
boulevard, north side, at tennis courts, near road	74		550		
boulevard, north side, tennis courts, north of sidewalk	75		150		
King Street West					
parking/loading area	76		1500		
parking/loading area	77	555			
parking area	78	280			
parking area	79	425			
boulevard, south side, east section	80		485		
boulevard, south side, centre section	81		415	690	
boulevard, south side, west section	82		585		
boulevard, south side, far west section	83		550		
boulevard, south side	84		190**		
backyard	85		1900		
front yard	86		485		
side yard	87		675		
soil strip	88		65	20	
front garden	89		11**		
elevated garden	90				35
elevated garden	91				20
elevated garden, at Tecumseth	92				10
loading area, SE corner of parking lot	93	270			
boulevard, south side, north or parking lot	94		550		
front lawn	95		350		
front/west side lawn	96		375		
Bathurst Street					
soil strip along fence, west side	97		64500*		
sidewalk to building, west side	98		9350*		
sidewalk to fence, west side	99	4150*			
front lawn, at parking lot	100		2300		
parking lot	101	595			
front flower garden	102				110
elevated front "lawn"	103		270	70	
elevated front "lawn"	104		360		
back lawn	105		85		
lane/loading area	106	375			
flower garden	107				865
parking/loading area	108	730			

TABLE 2 (Cont'd)

Location	Loc. Code	Soil Lead Concentration (µg/g) Sampling Depth in cm (0-2)	(0-5)	(15-20)	(0-15)
Portland Street					
driveway	109	450			
boulevard, east side	110		325	160	
driveway	111	490			
garden, south section	112	100			
garden, north section	113				20
boulevard, west side, near road	114		435		
boulevard, west side, near fence	115		430		
front lawn, south section	116		620		
front lawn, north section	117		560	140	
front lawn	118		710		
Stewart Street					
boulevard, south side, to 20m west of Portland	119		865		
boulevard, south side, 20m-30m west of Portland	120		1060	500	
boulevard, gravel-soil, north side	121	1550			
boulevard, gravel-soil, north side	122	3300			
boulevard, gravel-soil, north side	123	1100			
boulevard, north side	124		1200		
Front Street West					
boulevard, north side, 20m east of Bathurst	125		3250	920	
boulevard, north side	126		2950		
front lawn	127		1400	500	
boulevard, south side, near 1st lamp-pole E. Bathurst	128		9600		
boulevard, south side, near 2nd lamp-pole E. Bathurst	129		5700		
boulevard, south side, near 3rd lamp-pole E. Bathurst	130		4100		
boulevard, south side, near 4th lamp-pole E. Bathurst	131		2800		
boulevard, south side, near 5th lamp-pole E. Bathurst	132		2400		
boulevard, south side, near 6th lamp-pole E. Bathurst	133		2500		
Draper Street					
parking lot	134	245			
parking/loading area	135	495			
garden/weed strip	136		730		

* 1986 data
** 1985 data
a just outside designated study area

TABLE 3

Comparison of Soil Lead Concentrations, 1976 and 1986/87 for 61 Residential Sites in the Vicinity of TRS (sampling depth 0-5 cm)

	Soil Lead Concentration (µg/g dry weight)		
Location	1976	1986/87	Difference
Soil Replaced by MOE, 1977			
Niagara Street			
back yard	11500	885	
back yard	4290	no access	
back yard	7810	2400*	
back yard	7560	1900 (0-15 cm)	
front yard	3950	420	
front yard	3340	350*	
back yard	4100	1250	
back yard	4630	2950	
front yard	2790	500*	
Soil Not Known to Have Been Replaced			
Niagara Street			
front yard	2360	315	-2045
front yard	2100	1600	-500
front yard	2510	265	-2245
front yard	2030	260*	-1770
front yard	1030	625	-405
front strip	1160	640*	-520
back yard	1190	1075	-115
front yard	1090	565*	-525
front yard	1680	1200	-480
front yard	1860	1200	-660
back yard	1290	1450	+160
back yard	1210	1350	+140
front yard	1280	1600	+320
back yard	1460	1250	-210
front yard	1800	500	-1300
front yard	1130	810	-320
front yard	855	710	-145
front yard	813	645	-168
front yard	791	400*	-391
front yard	926	250*	-676
front yard	775	705	-70
front yard	433	380	-53
front yard	200	225*	+25
back yard	805	1100	+295
back yard	896	1080	+184

TABLE 3 (Cont'd)

Location	Soil Lead Concentration (µg/g dry weight) 1976	1986/87	Difference
Soil Not Known to Have Been Replaced			
Niagara Street (cont'd)			
front yard	303	245*	-58
back yard	734	1600*	+866
front yard	544	920	+376
back yard	306	610	+304
back yard	720	960*	+240
back yard	508	735*	+227
Tecumseth Street			
back yard	2080	1050*	-1030
front/side yard	1020	535	-485
front yard	404	240	-164
front yard	623	220	-403
back yard	613	345	-268
front yard	581	545*	-36
front yard	700	410*	-290
Wellington Street West			
front yard	1260	820*	-440
back yard	1440	1400	-40
front yard	565	535*	-30
front yard	449	405*	-44
back yard	272	610*	+338
back yard	780	340*	-440
back yard	640	260*	-380
front yard	544	495*	-49
front yard	451	280*	-171
back yard	609	575*	-34
back yard	754	680*	-74
front yard	649	410	-239
back yard	605	555	-50
back yard	623	610	-13
MEAN, 52 SITES WITHOUT KNOWN REPLACEMENT	970	704	-266

* 1986 results

RE2370

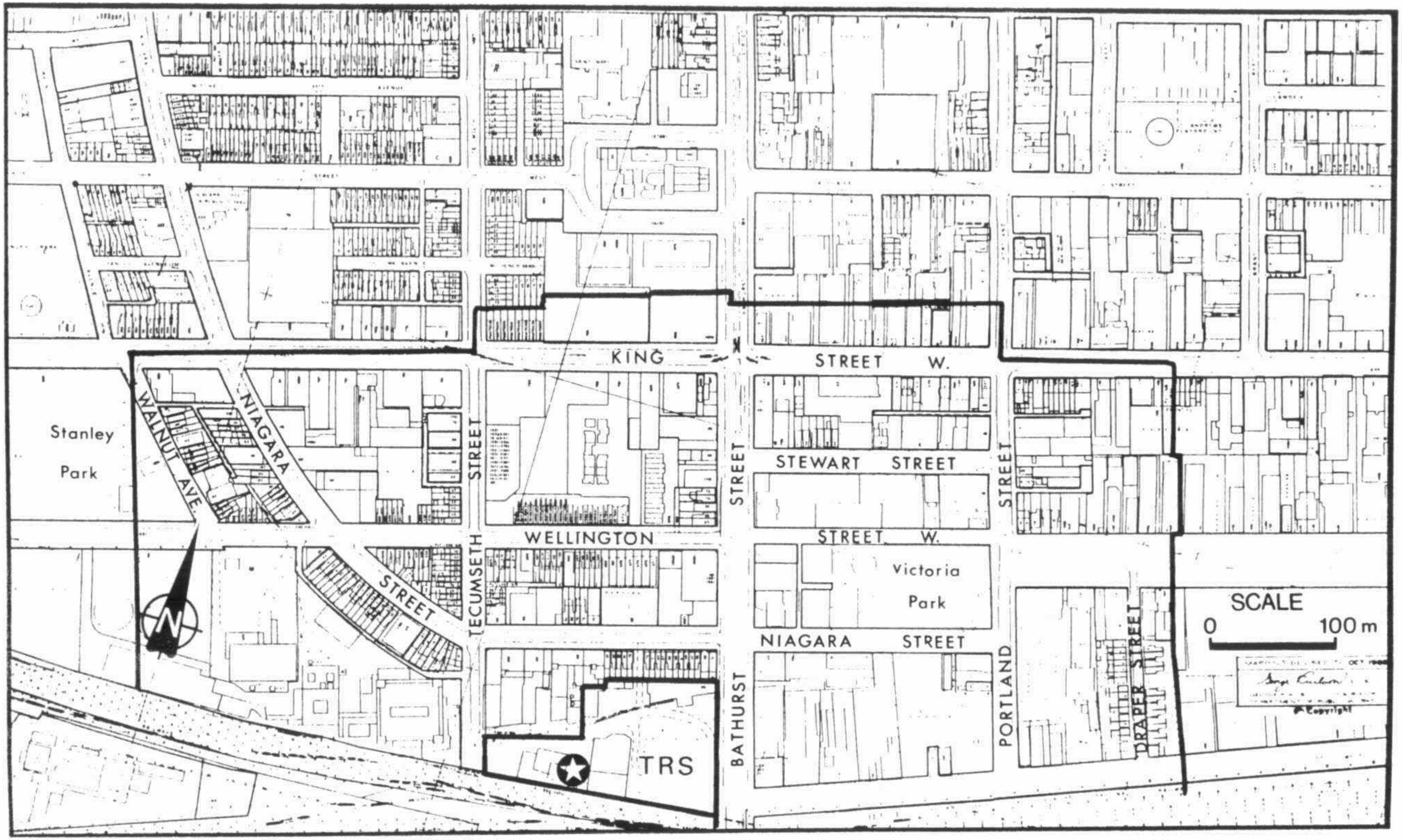

Figure 1 - Designated soil sampling area in the vicinity of Toronto Refiners and Smelters.

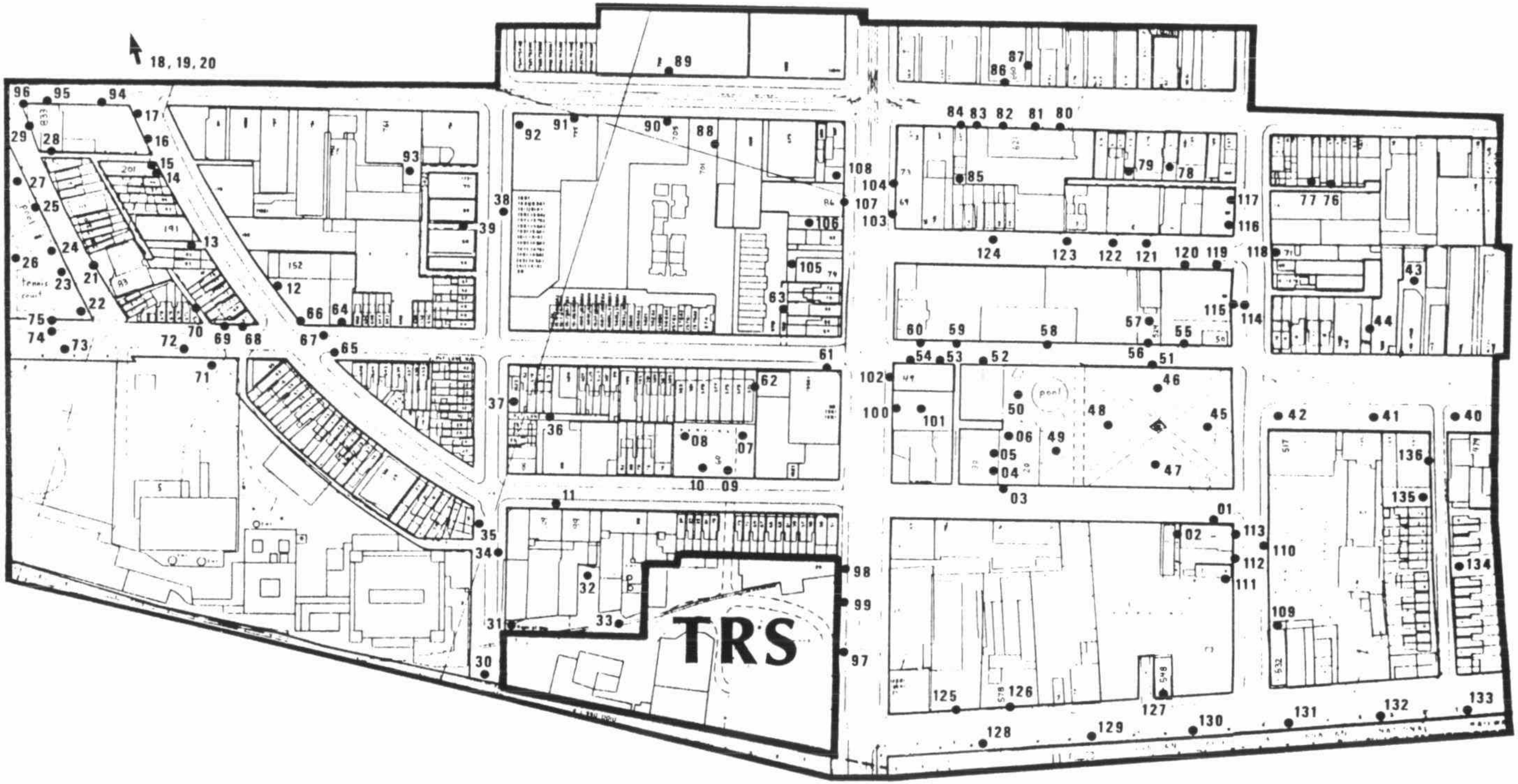

Figure 2 - Location of soil sampling sites on public and publicly accessible commercial properties in the TRS designated study area.

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